



General

Guideline Title

Screening for coronary heart disease with electrocardiography: U.S. Preventive Services Task Force recommendation statement.

Bibliographic Source(s)

U.S. Preventive Services Task Force. Screening for coronary heart disease with electrocardiography: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2012 Oct 2;157(7):512-18 . [13 references] [PubMed](#)

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Screening for coronary heart disease: recommendation statement. Ann Intern Med 2004 Apr 6;140(7):569-72.

Recommendations

Major Recommendations

The U.S. Preventive Services Task Force (USPSTF) grades its recommendations (A, B, C, D, or I) and identifies the levels of certainty regarding net benefit (High, Moderate, and Low). The definitions of these grades can be found at the end of the "Major Recommendations" field.

Summary of Recommendations and Evidence

The U.S. Preventive Services Task Force (USPSTF) recommends against screening with resting or exercise electrocardiography (ECG) for the prediction of coronary heart disease (CHD) events in asymptomatic adults at low risk for CHD events (D recommendation).

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening with resting or exercise ECG for the prediction of CHD events in asymptomatic adults at intermediate or high risk for CHD events (I statement).

Clinical Considerations

Patient Population under Consideration

This recommendation applies to adult men and women without symptoms of heart disease or a diagnosis of cardiovascular disease (CVD). In this recommendation, CHD refers to coronary artery disease and ischemic heart disease.

Assessment of Risk

Accurate identification of persons at high risk for CHD events, particularly nonfatal myocardial infarction (MI) and CHD death, provides the

opportunity to intensify risk factor management to reduce the likelihood of one of these events. In addition, identifying people at low risk may allow for a reduction in interventions with a low benefit-to-risk ratio in this risk stratum. Several factors are associated with higher risk for CHD events, including older age, male sex, high blood pressure, smoking, abnormal lipid levels, diabetes, obesity, and sedentary lifestyle.

Risk factors can be combined in many ways to allow classification of a person's risk for a CHD event as low, intermediate, or high. Several calculators and models are available to quantify a person's 10-year risk for CHD events. The Framingham Adult Treatment Panel III calculator (<http://hp2010.nhlbi.nih.net/atpIII/calculator.asp>) performs well for the U.S. population. Persons with a 10-year risk greater than 20% are generally considered high-risk, those with a 10-year risk less than 10% are considered low-risk, and those in the 10% to 20% range are considered intermediate-risk.

Screening Tests

Many resting and exercise ECG abnormalities have been associated with an increased risk for CHD events, such as MI and CHD death. Although exercise ECG is considered more sensitive for detecting coronary artery stenosis, the magnitude of increased risk for CHD events, as well as the sensitivity of ECG abnormalities for predicting future events, is similar for resting and exercise ECG. Performing baseline ECG so that results may be compared with future ECG findings is considered screening by the USPSTF and is not recommended for asymptomatic adults at low risk for CHD; evidence is insufficient about its usefulness in adults at increased risk.

For asymptomatic adults at low risk for CHD events, a resting or exercise ECG is unlikely to provide additional information about CHD risk beyond that obtained with conventional CHD risk factors (that is, Framingham risk factors) and result in changes in risk stratification that would prompt interventions and ultimately reduce CHD-related events. False-positive results may cause harms in low-risk asymptomatic adults; for more information about harms, go to the Suggestions for Practice Regarding the I Statement below and the Discussion sections in the original guideline document.

Treatment

Regardless of ECG findings, asymptomatic adults at increased risk for CHD are usually managed with a combination of diet and exercise modifications, lipid-lowering medications, aspirin, hypertension management, and tobacco cessation. The net benefit of the use of aspirin and the intensity of lipid-lowering therapy depends on a person's baseline risk for CHD.

Useful Resources

The USPSTF has made recommendations on the use of aspirin to prevent CVD, screening for lipid disorders, the use of additional risk factors to determine intermediate CHD risk, and screening for hypertension. These recommendations and their supporting evidence are available on the USPSTF Web site at www.uspreventiveservicestaskforce.org.

Suggestions for Practice Regarding the I Statement

In deciding whether to screen with resting or exercise ECG in asymptomatic adults who are at intermediate or high risk for CHD events, clinicians should consider the following.

Potential Preventable Burden

Although evidence is insufficient to determine whether screening adults at increased risk is beneficial, those who are at intermediate risk for CHD events have the greatest potential for net benefit from ECG screening. Reclassification into a higher risk category might lead to more intensive medical management that could lower the risk for CHD events, but it might also result in harms, including such adverse medication effects as gastrointestinal bleeding and hepatic injury. The risk-benefit tradeoff would be most favorable if persons could be accurately reclassified from intermediate to high risk. Regardless of ECG findings, persons who are already at high risk should receive intensive risk factor modification and those who are already classified as low risk are unlikely to benefit.

For persons in certain occupations, such as pilots and heavy equipment operators for whom sudden incapacitation or sudden death may endanger the safety of others, considerations other than the health benefit to the individual patient may influence the decision to screen for CHD. Although some exercise programs initially screen asymptomatic participants with exercise ECG, evidence is insufficient to determine the balance of benefits and harms of this practice.

Potential Harms

In all risk groups, an ECG abnormality (as a result of a true- or false-positive result) can lead to invasive confirmatory testing and treatments that have the potential for serious harm, including unnecessary radiation exposure and the associated risk for cancer. Studies report that up to 3% of asymptomatic patients with an abnormal exercise ECG result receive angiography and up to 0.5% undergo revascularization, even though

revascularization has not been shown to reduce CHD events in asymptomatic persons. Angiography and revascularization are associated with risks, including bleeding, contrast-induced nephropathy, and allergic reactions to the contrast agent.

Current Practice

Screening with resting or exercise ECG in low-risk patients is not recommended by any organization. However, evidence on current clinical use of screening for CHD with resting or exercise ECG in asymptomatic patients is sparse. Anecdotal evidence suggests that it is performed with some frequency.

Costs

Although the cost of resting ECG may be low, the downstream costs of resulting diagnostic testing and treatments can be substantial.

Definitions:

What the U.S. Preventive Services Task Force (USPSTF) Grades Mean and Suggestions for Practice

Grade	Grade Definitions	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer or provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.	Offer or provide this service.
C	<i>Note: The following statement is undergoing revision.</i> Clinicians may provide this service to selected patients depending on individual circumstances. However, for most individuals without signs or symptoms there is likely to be only a small benefit from this service.	Offer or provide this service only if other considerations support offering or providing the service in an individual patient.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I Statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	Read the "Clinical Considerations" section of the USPSTF Recommendation Statement (see "Major Recommendations" field). If the service is offered, patients should understand the uncertainty about the balance of benefits and harms.

USPSTF Levels of Certainty Regarding Net Benefit

Definition: The USPSTF defines *certainty* as "likelihood that the USPSTF assessment of the net benefit of a preventive service is correct." The net benefit is defined as benefit minus harm of the preventive service as implemented in a general, primary care population. The USPSTF assigns a certainty level based on the nature of the overall evidence available to assess the net benefit of a preventive service.

Level of Certainty	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	<p>The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by factors such as:</p> <ul style="list-style-type: none"> • The number, size, or quality of individual studies • Inconsistency of findings across individual studies • Limited generalizability of findings to routine primary care practice • Lack of coherence in the chain of evidence <p>As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be</p>

Level of Certainty	Description
	<p>large enough to alter the conclusion.</p> <p>The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of:</p> <ul style="list-style-type: none"> • The limited number or size of studies • Important flaws in study design or methods • Inconsistency of findings across individual studies • Gaps in the chain of evidence • Findings not generalizable to routine primary care practice • A lack of information on important health outcomes <p>More information may allow an estimation of effects on health outcomes.</p>

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Coronary heart disease (CHD), including coronary artery disease (CAD) and ischemic heart disease

Guideline Category

Prevention

Screening

Clinical Specialty

Cardiology

Family Practice

Internal Medicine

Preventive Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To summarize the current U.S. Preventive Services Task Force (USPSTF) recommendations on screening for coronary heart disease with

electrocardiography (ECG) and the supporting evidence

Target Population

Adult men and women without symptoms of heart disease or a diagnosis of cardiovascular disease

Interventions and Practices Considered

Screening for coronary heart disease using resting and exercise electrocardiography (ECG)

Major Outcomes Considered

Key Question No. 1: What are the benefits of screening for abnormalities on resting or exercise electrocardiography compared with no screening on coronary heart disease outcomes?

Key Question No. 2: How does the identification of high-risk persons via resting or exercise electrocardiography affect use of treatments to reduce cardiovascular risk?

Key Question No. 3: What is the accuracy of resting or exercise electrocardiography for stratifying persons into high-, intermediate- and low-risk groups?

Key Question No. 4: What are the harms of screening with resting or exercise electrocardiography?

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Note from the National Guideline Clearinghouse (NGC): A systematic evidence review was prepared by the Oregon Evidence-based Practice Center, Oregon Health & Science University, and Portland Veterans Affairs Medical Center, Portland, Oregon for the U.S. Preventive Services Task Force (USPSTF) (see the "Availability of Companion Documents" field).

Data Sources

Reviewers searched MEDLINE from 2002 through January 2011 and the Cochrane Library database through the fourth quarter of 2010 to identify relevant English-language articles. They also reviewed reference lists of relevant articles and included studies from the previous USPSTF review that met inclusion criteria.

Study Selection

Reviewers included studies that evaluated persons without symptoms of coronary heart disease (CHD), reported results separately for asymptomatic persons, or had fewer than 10% of participants with symptoms. Randomized, controlled trials and controlled observational studies were included if they evaluated the effects of screening with resting or exercise electrocardiography (ECG) versus no screening on clinical outcomes (benefits or harms) or the use of lipid-lowering therapy or aspirin (interventions for which recommended use varies by assessed cardiovascular risk). Prospective cohort studies that reported rates of cardiovascular outcomes and controlled for at least five of the seven Framingham cardiovascular risk factors (male sex, age, tobacco use, diabetes, hypertension, total or low-density lipoprotein cholesterol concentration, and high-density lipoprotein cholesterol concentration) by means of restriction (such as by enrolling only male participants) or

adjustment were also included. Two reviewers independently evaluated each study to determine inclusion eligibility. Only published studies were included.

Number of Source Documents

Key Question 1: 0

Key Question 2: 0

Key Question 3: 0 studies evaluating risk reclassification; 63 prospective cohort studies addressing electrocardiography (ECG) findings and risk for cardiovascular events (2 studies assessed both resting and exercise ECG)

Key Question 4: 2 studies

Methods Used to Assess the Quality and Strength of the Evidence

Expert Consensus

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Using methods developed by the U.S. Preventive Services Task Force (USPSTF), investigators assessed the aggregate internal validity (quality) of the body of evidence for each key question as "good," "fair," or "poor," on the basis of the number, quality, and size of the studies; consistency of results between studies; and directness of evidence (see Appendix B7 in the Evidence Synthesis [see the "Availability of Companion Documents" field]).

Methods Used to Analyze the Evidence

Meta-Analysis

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Note from the National Guideline Clearinghouse (NGC): A systematic evidence review was prepared by the Oregon Evidence-based Practice Center, Oregon Health & Science University, and Portland Veterans Affairs Medical Center, Portland, Oregon for the U.S. Preventive Services Task Force (USPSTF) (see the "Availability of Companion Documents" field).

Data Extraction and Quality Assessment

One investigator abstracted details about the population, study design, analysis, and duration of follow-up; the Framingham risk factors and other adjusted confounding factors; and results. A second investigator reviewed the data abstraction for accuracy. Two investigators independently applied criteria developed by the USPSTF to rate the quality of each study as good, fair, or poor. Discrepancies in quality ratings were resolved by consensus.

Data Synthesis and Analysis

Using methods developed by the USPSTF, investigators assessed the aggregate internal validity (quality) of the body of evidence for each key question as good, fair, or poor, on the basis of the number, quality, and size of the studies; consistency of results between studies; and directness of evidence.

To evaluate the benefits of screening for asymptomatic coronary heart disease (CHD), investigators focused on (in order of preference) death from

CHD, death from cardiovascular disease, nonfatal myocardial infarction, all-cause mortality, stroke, other cardiovascular outcomes (such as congestive heart failure), and composite cardiovascular outcomes. The accuracy of screening with electrocardiography (ECG) for identifying the presence or degree of asymptomatic atherosclerosis was not evaluated because of its unclear clinical implications. Participant anxiety, labeling, and rates and consequences of subsequent tests and procedures were evaluated to assess the harms of screening. Other USPSTF reviews have evaluated adverse outcomes associated with lipid-lowering therapy and aspirin.

Several methods were used to assess the incremental value of resting or exercise ECG. Investigators evaluated how adding screening with ECG to traditional risk factor assessment affects reclassification of persons as being at high (10-year risk for CHD events >20%), medium (10% to 20%), or low (<10%) risk compared with classification on the basis of traditional risk factors alone. The recent literature has emphasized understanding the frequency and accuracy by which people are reclassified into different risk categories, which can have an important effect on clinical decisions. Investigators also evaluated how adding resting or exercise ECG to traditional risk factor assessment changed the c-statistic (which measures how accurately a risk assessment method separates persons with from those without a disease or outcome), when this was reported, and whether screening with ECG improves calibration (the degree to which predicted and observed risk estimates agree).

Most studies did not provide sufficient data to estimate the degree and accuracy of reclassification. They instead provided an estimate of risk associated with the presence (versus the absence) of abnormalities on ECG after adjustment for traditional risk factors. Stata/IC, version 11.1 (StataCorp, College Station, Texas), was used to conduct meta-analyses of abnormalities on ECG that were evaluated by at least three studies of (in order of preference) adjusted estimates of risk for CHD death, death from cardiovascular disease, nonfatal myocardial infarction, all-cause mortality, or composite cardiovascular outcomes, using the DerSimonian–Laird random-effects model. Heterogeneity was estimated by using the I^2 statistic. If at least five studies evaluated an electrocardiographic abnormality, potential sources of heterogeneity were assessed by stratifying studies according to the outcome evaluated, study quality, and use of different definitions for the abnormality being evaluated. Sensitivity analyses were performed that excluded outlier studies, if present. Meta-regression was also performed on the proportion of men enrolled in the study, the number of traditional risk factors adjusted for (range, 5 to 7), and the duration of follow-up.

Methods Used to Formulate the Recommendations

Balance Sheets

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The U.S. Preventive Services Task Force (USPSTF) systematically reviews the evidence concerning both the benefits and harms of widespread implementation of a preventive service. It then assesses the certainty of the evidence and the magnitude of the benefits and harms. On the basis of this assessment, the USPSTF assigns a letter grade to each preventive service signifying its recommendation about provision of the service (see table below). An important, but often challenging, step is determining the balance between benefits and harms to estimate "net benefit" (that is, benefits minus harms).

Table 1. U.S. Preventive Services Task Force Recommendation Grid*

Certainty of Net Benefit	Magnitude of Net Benefit			
	Substantial	Moderate	Small	Zero/Negative
High	A	B	C	D
Moderate	B	B	C	D
Low	Insufficient			

*A, B, C, D, and I (*Insufficient*) represent the letter grades of recommendation or statement of insufficient evidence assigned by the U.S. Preventive Services Task Force after assessing certainty and magnitude of net benefit of the service (see the "Rating Scheme for the Strength of the Recommendations" field).

The overarching question that the Task Force seeks to answer for every preventive service is whether evidence suggests that provision of the service would improve health outcomes if implemented in a general primary care population. For screening topics, this standard could be met by a large randomized, controlled trial (RCT) in a representative asymptomatic population with follow-up of all members of both the group "invited for

screening" and the group "not invited for screening."

Direct RCT evidence about screening is often unavailable, so the Task Force considers indirect evidence. To guide its selection of indirect evidence, the Task Force constructs a "chain of evidence" within an analytic framework. For each key question, the body of pertinent literature is critically appraised, focusing on the following 6 questions:

1. Do the studies have the appropriate research design to answer the key question(s)?
2. To what extent are the existing studies of high quality? (i.e., what is the internal validity?)
3. To what extent are the results of the studies generalizable to the general U.S. primary care population and situation? (i.e., what is the external validity?)
4. How many studies have been conducted that address the key question(s)? How large are the studies? (i.e., what is the precision of the evidence?)
5. How consistent are the results of the studies?
6. Are there additional factors that assist the USPSTF in drawing conclusions (e.g., presence or absence of dose-response effects, fit within a biologic model)?

The next step in the Task Force process is to use the evidence from the key questions to assess whether there would be net benefit if the service were implemented. In 2001, the USPSTF published an article that documented its systematic processes of evidence evaluation and recommendation development. At that time, the Task Force's overall assessment of evidence was described as good, fair, or poor. The Task Force realized that this rating seemed to apply only to how well studies were conducted and did not fully capture all of the issues that go into an overall assessment of the evidence about net benefit. To avoid confusion, the Task Force has changed its terminology. Whereas individual study quality will continue to be characterized as good, fair, or poor, the term *certainty* will now be used to describe the Task Force's assessment of the overall body of evidence about net benefit of a preventive service and the likelihood that the assessment is correct. Certainty will be determined by considering all 6 questions listed above; the judgment about certainty will be described as high, moderate, or low.

In making its assessment of certainty about net benefit, the evaluation of the evidence from each key question plays a primary role. It is important to note that the Task Force makes recommendations for real-world medical practice in the United States and must determine to what extent the evidence for each key question—even evidence from screening RCTs or treatment RCTs—can be applied to the general primary care population. Frequently, studies are conducted in highly selected populations under special conditions. The Task Force must consider differences between the general primary care population and the populations studied in RCTs and make judgments about the likelihood of observing the same effect in actual practice.

It is also important to note that one of the key questions in the analytic framework refers to the potential harms of the preventive service. The Task Force considers the evidence about the benefits and harms of preventive services separately and equally. Data about harms are often obtained from observational studies because harms observed in RCTs may not be representative of those found in usual practice and because some harms are not completely measured and reported in RCTs.

Putting the body of evidence for all key questions together as a chain, the Task Force assesses the certainty of net benefit of a preventive service by asking the 6 major questions listed above. The Task Force would rate a body of convincing evidence about the benefits of a service that, for example, derives from several RCTs of screening in which the estimate of benefits can be generalized to the general primary care population as "high" certainty (see the "Rating Scheme for the Strength of Recommendations" field). The Task Force would rate a body of evidence that was not clearly applicable to general practice or has other defects in quality, research design, or consistency of studies as "moderate" certainty. Certainty is "low" when, for example, there are gaps in the evidence linking parts of the analytic framework, when evidence to determine the harms of treatment is unavailable, or when evidence about the benefits of treatment is insufficient. Table 4 in the methodology document listed below (see the "Availability of Companion Documents" field) summarizes the current terminology used by the Task Force to describe the critical assessment of evidence at all 3 levels: individual studies, key questions, and overall certainty of net benefit of the preventive service.

Sawaya GF et al. Update on the methods of the U.S. Preventive Services Task Force: estimating certainty and magnitude of net benefit. *Ann Intern Med.* 2007;147:871-875 [5 references].

I Statements

For I statements, the USPSTF has a new plan to commission its Evidence-based Practice Centers to collect information in 4 domains pertinent to clinical decisions about prevention and to report this information routinely. This plan is described in the paper: Petitti DB et al. Update on the methods of the U.S. Preventive Services Task Force: insufficient evidence. *Ann Intern Med.* 2009;150:199-205. <http://annals.org/article.aspx?articleid=744255>

The first domain is potential preventable burden of suffering from the condition. When evidence is insufficient, provision of an intervention designed

to prevent a serious condition (such as dementia) might be viewed more favorably than provision of a service designed to prevent a condition that does not cause as much suffering (such as rash). The USPSTF recognized that "burden of suffering" is subjective and involves judgment. In clinical settings, it should be informed by patient values and concerns.

The second domain is potential harm of the intervention. When evidence is insufficient, an intervention with a large potential for harm (such as major surgery) might be viewed less favorably than an intervention with a small potential for harm (such as advice to watch less television). The USPSTF again acknowledges the subjective nature and the difficulty of assessing potential harms: for example, how bad is a "mild" stroke?

The third domain is cost—not just monetary cost, but opportunity cost, in particular the amount of time a provider spends to provide the service, the amount of time the patient spends to partake of it, and the benefits that might derive from alternative uses of the time or money for patients, clinicians, or systems. Consideration of clinician time is especially important for preventive services with only insufficient evidence because providing them could "crowd out" provision of preventive services with proven value, services for conditions that require immediate action, or services more desired by the patient. For example, a decision to routinely inspect the skin could take up the time available to discuss smoking cessation, or to address an acute problem or a minor injury that the patient considers important.

The fourth domain is current practice. This domain was chosen because it is important to clinicians for at least 2 reasons. Clinicians justifiably fear that not doing something that is done on a widespread basis in the community may lead to litigation. More important, addressing patient expectations is a crucial part of the clinician–patient relationship in terms of building trust and developing a collaborative therapeutic relationship. The consequences of not providing a service that is neither widely available nor widely used are less serious than not providing a service accepted by the medical profession and thus expected by patients. Furthermore, ingrained care practices are difficult to change, and efforts should preferentially be directed to changing those practices for which the evidence to support change is compelling.

Although the reviewers did not explicitly recognize it when these domains were chosen, the domains all involve consideration of the potential consequences—for patients, clinicians, and systems—of providing or not providing a service. Others writing about medical decision making in the face of uncertainty have suggested that the consequences of action or inaction should play a prominent role in decisions.

Rating Scheme for the Strength of the Recommendations

What the U.S. Preventive Services Task Force (USPSTF) Grades Mean and Suggestions for Practice

Grade	Grade Definitions	Suggestions for Practice
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C	<i>Note: The following statement is undergoing revision.</i> Clinicians may provide this service to selected patients depending on individual circumstances. However, for most individuals without signs or symptoms there is likely to be only a small benefit from this service.	Offer or provide this service only if other considerations support offering or providing the service in an individual patient.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I Statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	Read the "Clinical Considerations" section of the USPSTF Recommendation Statement (see "Major Recommendations" field). If the service is offered, patients should understand the uncertainty about the balance of benefits and harms.

USPSTF Levels of Certainty Regarding Net Benefit

Definition: The USPSTF defines *certainty* as "likelihood that the USPSTF assessment of the net benefit of a preventive service is correct." The net benefit is defined as benefit minus harm of the preventive service as implemented in a general, primary care population. The USPSTF assigns a certainty level based on the nature of the overall evidence available to assess the net benefit of a preventive service.

Level of Certainty	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	<p>The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by factors such as:</p> <ul style="list-style-type: none"> • The number, size, or quality of individual studies • Inconsistency of findings across individual studies • Limited generalizability of findings to routine primary care practice • Lack of coherence in the chain of evidence <p>As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.</p>
Low	<p>The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of:</p> <ul style="list-style-type: none"> • The limited number or size of studies • Important flaws in study design or methods • Inconsistency of findings across individual studies • Gaps in the chain of evidence • Findings not generalizable to routine primary care practice • A lack of information on important health outcomes <p>More information may allow an estimation of effects on health outcomes.</p>

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Comparison with Guidelines from Other Groups

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Peer Review. Before the U.S. Preventive Services Task Force (USPSTF) makes its final determinations about recommendations on a given preventive service, the Evidence-based Practice Center and the Agency for Healthcare Research and Quality send a draft evidence review to four to six external experts and to Federal agencies and professional and disease-based health organizations with interests in the topic. The experts are asked to examine the review critically for accuracy and completeness and to respond to a series of specific questions about the document. After assembling these external review comments and documenting the proposed response to key comments, the topic team presents this information to the USPSTF in memo form. In this way, the USPSTF can consider these external comments before it votes on its recommendations about the service. Draft recommendation statements are then circulated for comment among reviewers representing professional societies, voluntary organizations, and Federal agencies, as well as posted on the Task Force Web site for public comment. These comments are discussed before the final recommendations are confirmed.

Response to Public Comment. A draft version of this recommendation was posted on the USPSTF Web site from 27 September to 25 October 2011 and again from 30 November to 13 December 2011. A few comments were received on the lack of information about the harms of ECG screening in asymptomatic adults. More information on the harms of screening was added to the Clinical Considerations section. Several comments requested clarification about whether the recommendation applied to both men and women and whether it applied to baseline ECG. The USPSTF revised the statement to clarify that it applies to both men and women and that baseline ECG is considered screening and is included in this

recommendation. A few comments requested clarification that this recommendation applies to screening for coronary artery disease and ischemic heart disease and not to other forms of heart disease; this was clarified in the Clinical Considerations section.

Comparison with Guidelines from Other Groups. Recommendations for screening from the following groups were discussed: American College of Cardiology Foundation, the American Heart Association, and the American Academy of Family Physicians.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is not specifically stated for each recommendation.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Benefits of Detection and Early Intervention

For asymptomatic adults at low risk for coronary heart disease (CHD) events, the U.S. Preventive Services Task Force (USPSTF) found adequate evidence that the incremental information offered by resting or exercise electrocardiography (ECG) (beyond that obtained with conventional CHD risk factors) is highly unlikely to result in changes in risk stratification that would prompt interventions and ultimately reduce CHD-related events. The USPSTF based this conclusion on the epidemiology of CHD, the natural history of CHD, and established treatment strategies based on risk stratification.

For asymptomatic adults at intermediate or high risk for CHD events, the USPSTF found inadequate evidence to determine the extent to which the incremental information offered by resting or exercise ECG (beyond that obtained with conventional CHD risk factors) results in changes in risk stratification that would prompt interventions and ultimately reduce CHD-related events.

Potential Harms

Harms of Detection and Early Intervention

There is adequate evidence that screening asymptomatic adults with resting or exercise electrocardiography (ECG) leads to harms that are at least small, including unnecessary invasive procedures, overtreatment, and labeling.

Qualifying Statements

Qualifying Statements

- The U.S. Preventive Services Task Force (USPSTF) makes recommendations about the effectiveness of specific clinical preventive services for patients without related signs or symptoms.
- It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment.
- The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.
- Recommendations made by the USPSTF are independent of the U.S. government. They should not be construed as an official position of the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services.

Implementation of the Guideline

Description of Implementation Strategy

The experiences of the first and second U.S. Preventive Services Task Force (USPSTF), as well as that of other evidence-based guideline efforts, have highlighted the importance of identifying effective ways to implement clinical recommendations. Practice guidelines are relatively weak tools for changing clinical practice when used in isolation. To effect change, guidelines must be coupled with strategies to improve their acceptance and feasibility. Such strategies include enlisting the support of local opinion leaders, using reminder systems for clinicians and patients, adopting standing orders, and audit and feedback of information to clinicians about their compliance with recommended practice.

In the case of preventive services guidelines, implementation needs to go beyond traditional dissemination and promotion efforts to recognize the added patient and clinician barriers that affect preventive care. These include clinicians' ambivalence about whether preventive medicine is part of their job, the psychological and practical challenges that patients face in changing behaviors, lack of access to health care or of insurance coverage for preventive services for some patients, competing pressures within the context of shorter office visits, and the lack of organized systems in most practices to ensure the delivery of recommended preventive care.

Dissemination strategies have changed dramatically in this age of electronic information. While recognizing the continuing value of journals and other print formats for dissemination, the USPSTF Task Force will make all its products available through its [Web site](#) . The combination of electronic access and extensive material in the public domain should make it easier for a broad audience of users to access USPSTF materials and adapt them for their local needs. Online access to USPSTF products also opens up new possibilities for the appearance of the annual, pocket-size *Guide to Clinical Preventive Services*.

To be successful, approaches for implementing prevention have to be tailored to the local level and deal with the specific barriers at a given site, typically requiring the redesign of systems of care. Such a systems approach to prevention has had notable success in established staff-model health maintenance organizations, by addressing organization of care, emphasizing a philosophy of prevention, and altering the training and incentives for clinicians. Staff-model plans also benefit from integrated information systems that can track the use of needed services and generate automatic reminders aimed at patients and clinicians, some of the most consistently successful interventions. Information systems remain a major challenge for individual clinicians' offices, however, as well as for looser affiliations of practices in network-model managed care and independent practice associations, where data on patient visits, referrals, and test results are not always centralized.

Implementation Tools

Foreign Language Translations

Mobile Device Resources

Patient Resources

Pocket Guide/Reference Cards

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

U.S. Preventive Services Task Force. Screening for coronary heart disease with electrocardiography: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2012 Oct 2;157(7):512-18 . [13 references] [PubMed](#)

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1996 (revised 2012 Oct 2)

Guideline Developer(s)

U.S. Preventive Services Task Force - Independent Expert Panel

Guideline Developer Comment

The U.S. Preventive Services Task Force (USPSTF) is a federally-appointed panel of independent experts. Conclusions of the USPSTF do not necessarily reflect policy of the U.S. Department of Health and Human Services (DHHS) or its agencies.

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Guideline Committee

U.S. Preventive Services Task Force (USPSTF)

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Minneapolis Veteran Affairs Medical Center, Minneapolis, Minnesota). Sanford Schwartz, MD, a former USPSTF member, also contributed to the development of this recommendation.

**Members of the USPSTF at the time this recommendation was finalized. For a list of current Task Force members, go to <http://www.uspreventiveservicestaskforce.org/Page/Name/our-members> .*

Financial Disclosures/Conflicts of Interest

The U.S. Preventive Services Task Force (USPSTF) has an explicit policy concerning conflict of interest. All members disclose at each meeting if they have a significant financial, professional/business, or intellectual conflict for each topic being discussed. USPSTF members with conflicts may be recused from discussing or voting on recommendations about the topic in question.

Disclosure forms from USPSTF members can be viewed at www.acponline.org/authors/icmjic/ConflictOfInterestForms.do?msNum=M12-1607 .

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Screening for coronary heart disease: recommendation statement. Ann Intern Med 2004 Apr 6;140(7):569-72.

Guideline Availability

Electronic copies: Available from the [Annals of Internal Medicine Web site](#) .

Availability of Companion Documents

The following are available:

Evidence Reviews:

- Chou R, Arora B, Dana T, Fu R, Walker W, Humphrey L. Screening asymptomatic adults with resting or exercise electrocardiography: a review of the evidence for the U.S. Preventive Services Task Force. Ann Intern Med 2011;155:375-383.
- Chou R, Arora B, Dana T, Fu R, Walker W, Humphrey L. Screening asymptomatic adults for coronary heart disease with resting or exercise electrocardiography: systematic review to update the 2004 U.S. Preventive Services Task Force recommendation. Evidence synthesis No. 88. AHRQ Publication No. 11-05158-EF-1. Rockville (MD): Agency for Healthcare Research and Quality; 2011 Sep.
- Matheny M, McPheeters ML, Glasser A, Mercaldo N, Weaver RB, Jerome RN, Walden R, McKoy JN, Pritchett J, Tsai C. Systematic review of cardiovascular disease risk assessment tools. Evidence synthesis No. 85. AHRQ Publication No. 11-05155-EF-1. Rockville (MD): Agency for Healthcare Research and Quality; 2011 May.

Electronic copies: Available from the [U.S. Preventive Services Task Force \(USPSTF\) Web site](#) .

Background Articles:

- Barton MB et al. How to read the new recommendation statement: methods update from the U.S. Preventive Services Task Force. Ann Intern Med 2007;147:123-127.
- Guirguis-Blake J et al. Current processes of the U.S. Preventive Services Task Force: refining evidence-based recommendation development. Ann Intern Med 2007;147:117-122.
- Sawaya GF et al. Update on the methods of the U.S. Preventive Services Task Force: estimating certainty and magnitude of net benefit. Ann Intern Med 2007;147:871-875.
- Petitti DB et al. Update on the methods of the U.S. Preventive Services Task Force: insufficient evidence. Ann Intern Med. 2009;150:199-205.

Electronic copies: Available from the [USPSTF Web site](#) .

The following are also available:

- Screening for coronary heart disease with electrocardiography: clinical summary of U.S. Preventive Services Task Force recommendation. 2012 Jul. Electronic copies: Available from the [USPSTF Web Site](#) .
- The guide to clinical preventive services, 2010-2011. Recommendations of the U.S. Preventive Services Task Force. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ), 2010. 292 p. Electronic copies available from the [AHRQ Web site](#) . See the related QualityTool summary on the [Health Care Innovations Exchange Web site](#) .

The [Electronic Preventive Services Selector \(ePSS\)](#) , available as a PDA application and a web-based tool, is a quick hands-on tool designed to help primary care clinicians identify the screening, counseling, and preventive medication services that are appropriate for their patients. It is based on current recommendations of the USPSTF and can be searched by specific patient characteristics such as age, sex, and selected behavioral risk factors.

Patient Resources

The following are available:

- Screening for coronary heart disease with electrocardiography. Understanding Task Force recommendations. U.S. Preventive Services Task Force. Consumer fact sheet. 2012 Jul. 3 p. Electronic copies: Available from the [U.S. Preventive Services Task Force Web site](#) .
- Screening for coronary heart disease with electrocardiography. Summary for patients. 2012 Jul. Electronic copies: Available from the [Annals of Internal Medicine Web site](#) .
- Women: stay healthy at any age. Rockville (MD): Agency for Healthcare Research and Quality. AHRQ Pub. No. 10-IP002-A. 2010 Aug. 2 p. Electronic copies: Available in Portable Document Format (PDF) in [English](#) and [Spanish](#) from the AHRQ Web site. See the related QualityTool summary on the [Health Care Innovations Exchange Web site](#) .
- Men: stay healthy at any age. Rockville (MD): Agency for Healthcare Research and Quality. AHRQ Pub. No. 10-IP004-A. 2010 Aug. 2 p. Electronic copies: Available in PDF in [English](#) and [Spanish](#) from the AHRQ Web site. See the related QualityTool summary on the [Health Care Innovations Exchange Web site](#) .

Print copies: Available in English and Spanish from the Agency for Healthcare Research and Quality (AHRQ) Publications Clearinghouse. For more information, go to <http://www.ahrq.gov/research/publications/index.html> or call 1-800-358-9295  (U.S. only).

Myhealthfinder is a new tool that provides personalized recommendations for clinical preventive services specific to the user's age, gender, and pregnancy status. It features evidence-based recommendations from the USPSTF and is available at www.healthfinder.gov .

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

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